

NON-PUBLIC?: N  
ACCESSION #: 8906290105  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Braidwood, Unit 1 PAGE: 1 OF 03

DOCKET NUMBER: 05000456

TITLE: Turbine Trip and Subsequent Rx Trip During Monthly Turbine Valve Cycle Surveillance

EVENT DATE: 10/09/87 LER #: 87-057-01 REPORT DATE: 01/11/88

OPERATING MODE: 1 POWER LEVEL: 049

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Michael J. Smith, Technical Staff Engineer Ext. 2478

TELEPHONE: (815)458-2801

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 1700 on October 9, 1987, 1BWOS 3.4.2.A-1. Turbine Throttle, Governor, Reheat and Intercept valve monthly surveillance was in progress. Digital Electro Hydraulic Control System (DEH) was in AUTOMATIC. Megawatt (MW) feedback loop was OUT, per procedure, and the turbine throttle valves were in TEST. At approximately 1725, as throttle valve #2 was being cycled, MW output became erratic. Governor valves went to their fully closed position. Attempts were made to manually open the governor valves, but were unsuccessful. A turbine trip on anti-motoring resulted in a Reactor Trip at 1726.

Root cause is indeterminate. Immediate action was to establish stable plant conditions. Temporary instrumentation verified that the sensing line arrangement did not cause the trip. Also, simulator testing done by Westinghouse Automation Division revealed that no software problems exist with the DEH Control System. Proposed actions by Westinghouse include; reduce Impulse Pressure Feedback Loop sensitivity, increase Impulse Feedback Loop

response time, reduce deadband of Impulse Pressure Feedback Loop, and install diagnostic tapes to the DEN system to analyze any hardware problems.

No previous occurrences.

1868m(011288)/28

END OF ABSTRACT

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#### A. PLANT CONDITION PRIOR TO EVENT:

Unit: Braidwood 1 ; Event Date: October 9 1987; Event Time: 1726

MODE: 1 - Power Operation ; Rx Power: 49% ;  
RCS (AB)Temperature/Pressure: 579 degrees F/2235 psig

#### B. DESCRIPTION EVENT:

There were no systems or components inoperable at the beginning of the event which contributed to the severity of the event.

At approximately 1700 on October 9, 1987, Operating Department personnel were performing 1BWOS 3.4.2.A-1. Turbine Throttle, Governor, Reheat and Intercept Valve monthly surveillance. The purpose of this surveillance is to fully cycle each of the subject valves from the running position in order to support operability verification of the turbine overspeed protection system. The surveillance consists of two parts: testing at power (Part 1) and testing during plant startup (Part 2). Performance of either part satisfies the surveillance requirements. This was the initial execution of Part 1. A Westinghouse Turbine Digital Electro Hydraulic (DEH) Control System Engineer was in attendance during the surveillance as requested by station management.

The surveillance was entered with the DEH System in fully automatic with the governor valves in single valve control. The surveillance procedure required the megawatt feedback loop OUT (deactivated), and turbine throttle valves in VALVE TEST MODE.

At approximately 1715 on October 9, 1987, throttle valve #1 was cycled, per the procedure from the fully open to the fully closed position and was then fully reopened. No apparent problems were observed. The governor valves controlled the turbine in a stable condition as verified by the governor valve stability. Turbine megawatts varied only a few percent, which is not unusual

since the megawatt feedback loop was deactivated. This was done in accordance with the latest vendor information.

At approximately 1725 on October 9, 1987, throttle valve #2 was cycled in the same manner as throttle valve #1. However, as the valve approached the fully closed position, megawatt output became erratic. The governor valves went to their fully closed position. At this time, the operator placed the DEH Turbine Controller in manual. Attempts made by the operator to manually open the turbine governor valves were not successful, and subsequently the turbine tripped on anti-motoring which resulted in a reactor trip at 1726 per the design of the Reactor Protection System.

On October 16, 1987, the unit was brought back on line. During the power ascension, part 2, testing during plant startup, was performed to meet the requirements of surveillance 1BWOS 3.4.2.A-1.

Operator actions neither increased or decreased the severity of the event.

The appropriate NRC notification via the ENS Phone System was made at 1843 on October 9, 1987, pursuant to 10CFR50.72(b)(2)(ii).

This event is being reported pursuant to 10CFR50.73(a)(2)(iv) - any event or condition that resulted in manual or automatic actuation of any engineered safety feature, including the reactor protection system.

#### C. CAUSE OF EVENT:

The root cause as to why the load swing occurred when the #2 throttle valve approached the closed position is indeterminate.

Actions to reduce the likelihood of a similar event are outlined in the Corrective Actions section.

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#### D. SAFETY ANALYSIS

The safety consequences of this event were minimal as the turbine trip resulted in an immediate reactor trip, per the design of the reactor protection system. Under worst case conditions of operating at 100% power, sufficient redundancy exists in the reactor protection system logic to ensure that a turbine trip and reactor trip would occur. Therefore, the safety of the plant and public would not be affected.

## E. CORRECTIVE ACTIONS

Immediate corrective action was to establish stable plant conditions.

Other actions that have been implemented to prevent recurrence include:

1) Temporary instrumentation has been installed on the sensing line of turbine impulse pressure transmitter 1FT-MS002 to monitor the impulse pressure signal being supplied to the DEH computer. The sensing line is approximately ninety-nine feet in length, which may dampen the pressure signal being sensed at the transmitter. The purpose of the temporary instrumentation is to determine the affects of the long sensing line on the ability of the turbine DEH system to control the turbine during a transient. Westinghouse has reviewed the data obtained from the temporary instrumentation installed on the impulse pressure transmitter sensing line. The results of this review revealed the sensing line arrangement did not cause the control instability which caused the turbine trip.

2) Westinghouse Automation Division has tested the Braidwood turbine DEH software on their simulator. The purpose of the software simulation was to see if a software problem exists. The results of this testing revealed that a software problem does not exist with the DEH software. However, Westinghouse has proposed that the following DEH control parameters be changed to greatly reduce the likelihood of a control instability similar to that which may have caused this event.

a) Reduce the Impulse Pressure Feedback Loop sensitivity (gain).

b) Increase the Impulse Pressure Feedback Loop response time (reset time).

c) Reduce the allowable deadband of the Impulse Pressure Feedback Loop to decrease the amount that actual impulse pressure can vary from design before the DEH control logic rejects the signal input.

Item 456-200-87-36301 is tracking the completion of DEH software changes.

3) During the next outage of sufficient duration, Westinghouse engineers are going to install diagnostic tapes into the DEH system. The purpose of this analysis is to reveal if a hardware problem exists in the DEH Control System.

Item 456-200-87-36302 is tracking the completion of this analysis.

## F. PREVIOUS OCCURRENCES

There have been no previous occurrences of a Turbine Trip resulting from Monthly Turbine Valve Cycle Testing.

G. COMPONENT FAILURE DATA

No components failed due to or as a result of this event.

1868m(011888)/30

ATTACHMENT 1 TO 8906290105 PAGE 1 OF 2

FIGURE OMITTED  
SUPPLEMENT TO DVR

ATTACHMENT 2 TO 8906290105 PAGE 2 OF 2

Commonwealth Edison  
Braidwood Nuclear Power Station  
Route #1, Box 84  
Braceville, Illinois 60407  
Telephone 815/458-2801

June 14, 1989  
BW/89-697

U. S. Nuclear Regulatory  
Commission Document Control Desk  
Washington, D.C. 20555

Dear Sir:

The enclosed Licensee Event Report from Braidwood Generating Station is being transmitted to you as a Supplemental Report to LER 87-057-00.

This report is number 87-057-01; Docket No. 50-456.

Very truly yours,

R. E. Queri  
Station Manager  
Braidwood Nuclear Station

REQ/AJS/jab  
(7126z)

Enclosure: Licensee Event Report No. 87-057-01

cc: NRC Region III Administrator  
NRC Resident Inspector  
INPO Record Center  
CECo Distribution List

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